REMARKS

Status of the Claims

Claims 2, 17-20, 22 and 23 are pending. Claim 2 has been amended. No new matter has been added. For instance, amended claim 2 is supported by paragraphs [0031] and [0032] of the specification. Further, the Examiner is respectfully requested to enter this Amendment After Final, in that it raises no new issues but merely places the claims in a form more clearly patentable over the references of record. In the alternative, the Examiner is respectfully requested to enter this Amendment After Final in that it reduces the issues for appeal.

Reconsideration of this application is respectfully requested.

Issues under 35 U.S.C. §103(a)

Claims 2, 17-20 and 23 stand rejected under 35 U.S.C. § 103(a) as being obvious over the English machine translation of JP 2002-226914 (JP '914) in view of the English machine translation of JP 11-350075 (JP '075).

Further, claims 2, 17, 22 and 23 stand rejected under 35 U.S.C. § 103(a) as being obvious over WO 03/085149 (by use of the English equivalent US 2004/0187981 (US '981)).

Lastly, claims 2, 22 and 23 stand rejected under 35 U.S.C. § 103(a) as being obvious over JP '914 in view of US 6,086,685 (US '685).

These rejections are respectfully traversed.

The Present Invention

Claim 2 of the present invention is directed to a method for producing a steel rail having a high content of carbon in mass%, C: more than 0.85% but less than or equal to 1.40%, Si: 0.05 to 2.00%, Mn: 0.05 to 2.00%, B: 0.0001 to 0.0050%, N: 0.0060 to 0.0200%, at least one of V: 0.005 to 0.500% and Nb: 0.002 to 0.050%, and optionally one or more selected from Cr: 0.05 to 2.00%, Mo: 0.01 to 0.50%, Co: 0.003 to 2.00%, Cu: 0.01 to 1.00%, Ni: 0.01 to 1.00%, Ti: 0.0050 to 0.0500%, Mg: 0.0005 to 0.0200%, Ca: 0.0005 to 0.0150%, Al: 0.0100 to 1.00%, and Zr: 0.0001 to 0.2000%, and the balance being Fe and unavoidable impurities, comprising: finish rolling said rail in three or more passes, with a reduction rate per pass of a cross-section of said rail of 2-30% so as to precipitate V-carbide, V-nitride, V-carbonitride, Nb-carbide, and Nb-

carbonitride in austenite structure in said rail during said finish rolling, wherein conditions of said finish rolling satisfy the following relationship: $S \leqq CPT2 \leqq 0.70$ wherein CPT2 is the value expressed by the following expression 2 $CPT2 = 2400 / (C \times T \times P)$ (expression 2) wherein S is the maximum rolling interval time (seconds) and is more than or equal to 0.10 seconds and less than or equal to 0.70 seconds, and $(C \times T \times P)$ is defined as follows; C is the carbon content of the steel rail in mass%, and T is the maximum surface temperature (°C) of a rail head, and P is the number of passes, which is 3 or more.

Distinctions Over the Cited Art

In the previous Reply of December 28, 2011, Applicants argued that the cited art alone or in combination fails as a whole to suggest or disclose the precipitation of V-carbide, V-nitride, V-carbonitride, Nb-carbide, and Nb-carbonitride in austenite structure in a rail finish rolling.

However, at pages 4, 8 and 9 of the current Office Action, the Examiner continues to assert inherency. In particular, the Examiner indicates that

> JP '914 in view of JP '075 or JP '914 in view of US '685 also differs from instant claim 2 because they do not specifically teach that the finish rolling is performed so as to precipitate V-carbide, V-nitride, V-carbonitride, Nb-carbide, and Nb-carbonitride in austenite structure in the rail during the finish rolling. However, one of skill in the art would have expected the finish rolling step in the method of JP '914 in view of JP '075 or JP '914 in view of US '685 to inherently precipitate V-carbide, V-nitride, V-carbonitride, Nb-carbide, and Nb-carbonitride in austenite structure since the method of JP '914 in view of JP '075 or JP '914 in view of US '685 is substantially similar to the instant claimed method with overlapping temperatures and steel rail compositions that overlap with the claimed composition. (emphasis added).

Applicants respectfully disagree for at least the following reasons.

The present invention aims to improve wear resistance and ductility by using specific conditions recited in independent claim 2. Even if the same or similar composition between the present invention and the cited art were to be hypothetically used, depending on the control of the specific conditions such as specific maximum rolling interval time (S), PC value and/or cooling rate when the temperature of the rail head is more than 700°C, etc., the properties of the resulting rails vary. See the Examples of the present specification.

Specifically, for instance, in TABLES 1-3 of the specification, rail 10 using a maximum rolling interval time of 0.4 sec. exhibits 2.0% higher total elongation (on the tensile test) than that of rail 32 using a maximum rolling interval time of 0.8 sec. (outside scope of claim 2), although rails 10 and 32 have the same composition (G) and the same maximum head temperature of 930°C. These differences arise from the fact that the maximum rolling interval time (0.4 sec.) of rail 10 in TABLE 2 is controlled to be less than the value of expression (2) (i.e., $S \leqq CPT2 \leqq 0.70$ where S is the maximum rolling interval time (seconds) and is more than or equal to 0.10 sec. and less than or equal to 0.70 sec.). On the other hand, the maximum rolling interval time of rail 32 in TABLE 3 is not controlled to be less than the value of expression (2).

As another example, rail 5 using a maximum rolling interval time of 0.5 sec. exhibits 1.1% higher total elongation (on the tensile test) than that of rail 29 using a maximum rolling interval time of 1.2 sec. (outside scope of claim 2), even though rails 5 and 29 have the same composition (D) and the maximum head temperature of 950°C. In the same context as the above rails 10 and 32, it is apparent that such differences arise from the fact that the maximum rolling interval time of rail 5 in TABLE 2 is controlled to be less than expression (2) while the maximum rolling interval time (1.2 sec.) of rail 29 in TABLE 3 is not.

Therefore, even if the composition and maximum head temperature are the same, when the maximum rolling interval time is different, ductility (elongation rate) differs. Thus, it cannot be said that overlapping temperatures and compositions inherently precipitate V-carbide, V-nitride, V-carbonitride, Nb-carbide, and Nb-carbonitride in austenite structure in said rail during said finish rolling.

Applicants respectfully submit that inherency cannot result from a combination of references, but rather must legally result from a single reference. In this context, supportive case law states that "requiring applicant to compare the claimed invention with polymer suggested by the combination of references relied upon in the rejection of the claimed invention under 35 U.S.C. §103 would be requiring comparison of the results of the invention with the results of the invention." (In re Chapman, 148 USPQ 711 (CCPA 1966)). That is, neither JP '914 in view of JP '075 nor JP '914 in view of US '685 obtains such precipitates in austenite structure, hence, there is no inherency and further no expectation of obtaining such precipitates in austenite structure from the cited art.

[0009] of JP '914 discloses that the time between rolling passes is "10 seconds or less" and [0031], [0195] and [0207] of US '981 disclose that the time between rolling passes is "not longer than 10 seconds." Based on these disclosures, the Examiner asserts that such range overlaps with the claimed time range S. It is noted that the claimed S refers to "the maximum rolling interval time when rolling passes are 3 or more." JP '914 or US '981 (although they generally discloses a broader range) fails to specifically disclose the claimed specific S range of "$0.10 \leqq S \leqq 0.70$" when rolling passes 3 or more. In fact, the Examples of JP '914 disclose "7 sec." between 2 passes and 3 passes (Table 2). There is no explicit disclosure of the maximum rolling interval time between 3 passes and 4 passes. Also, the Examples of US '981 disclose the maximum rolling interval time "1 or 2 sec." between 3 passes and 4 passes (Tables 6 and 7). As explained above, when using a maximum rolling interval time outside of the claimed range 0.10-0.70 sec., the ductility (total elongation on the tensile test) decreases. Thus, it is evident that the cited art referring to values outside of the claimed S range fails to recognize the significance or criticality of the claimed invention.

With regard to this feature, case law states that "If the proportions are critical to the properties of the novel product, they can render the product patentable even though the percentages of ingredients fall within the broader ranges of the prior art." (Becket v. Coe (CADC 1938) 38 USPQ 26, In re Becket et al. (CCPA 1937) 33 USPQ 33, In re Arness (CCPA 1938) 37 USPQ 217). With keeping this case law in mind, the Examples of the present specification demonstrate that the feature of "the claimed S range being "$0.10 \leqq S \leqq 0.70$" contributes to improved ductility. Thus, such feature is further distinct from the cited references.

As discussed above, Applicants' range is critical and the present invention achieves unexpected results relative to the broader range of the prior art. Accordingly, such criticality of the specific range of the maximum interval time should be reconsidered.

The deficiencies of the respective primary references JP '914 and US '981 cannot be cured by the respective secondary references of JP '075 and US '685 since these secondary references also fail to disclose or suggest the claimed features.

For the reasons set forth above, reconsideration and withdrawal of the rejections are respectfully requested.

Conclusion

All of the stated grounds of rejections have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Craig A. McRobbie, Registration No. 42874, at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

Dated: JUN 09 2011

Respectfully submitted,

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